

**REMARKS**

Claims 18-35 are all of the claims currently pending.

It is noted that Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

The Examiner objects to claims 18, 24, and 25, as further discussed below.

Claims 30-35 stand rejected under 35 U.S.C. § 112, first paragraph, as failing the enablement requirement. Claims 18-23, 33, and 34 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

Claims 25, 26, and 29 stand rejected under 35 U.S.C. § 102(a) as anticipated by U.S. Patent No. 6,462,795 to Clarke. Claims 18-24 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Clarke, further in view of U.S. Patent No. 4,414,565 to Shanks. Claim 27 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Clarke, further in view of US Patent 6,462,794 to Yoshikawa et al. Claim 28 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Clarke, further in view of US Patent 6,714,173 to Shinoura.

These rejections are respectfully traversed in the following discussion.

**I. THE CLAIMED INVENTION**

As described by, for example, claim 18, the claimed invention is directed to an image display apparatus providing an enhanced impression of an optical perspective. At least one micro lens array assembly comprising a plurality of convex micro lenses is arranged in at least one convex micro lenses matrix to thereby form a lens system.

For each micro lens array assembly, a display located relative to the micro lens array assembly projects a two-dimensional image through the micro lens array assembly to be focused on an opposite side thereof as an imaging plane. Each micro lens array assembly is configured to create an imaging plane displaying an erect real image of the two-dimensional image at a same magnification.

The imaging plane provides an enhanced three-dimensional impression of the two-dimensional image by providing an illusion of depth in the displayed real image that is consistent with a three-dimensional object.

As discussed in the second full paragraph on page 2 of the specification, in the

conventional method of enhancing the three-dimensional effect using lenticular lens, special strip-shaped images are required.

The claimed invention, on the other hand, allows a simple (e.g., non-modified) two-dimensional image to be enhanced without special viewer glasses or constructing special versions of the two-dimensional image.

In another aspect described by recently-added claim 25, the present invention also addresses an image display apparatus that includes a display for displaying a two-dimensional image and a micro lens array spaced apart from the display for creating an imaging plane in a space opposite the display. The micro lens array is an upright image optical system having a same magnification, the micro lens array being not parallel to the display.

An advantage of this aspect of the present invention is that the created image has always the same size regardless of the distance between the display and the micro lens array.

## **II. THE CLAIM OBJECTIONS**

The Examiner objects to claims 18, 24, and 25 as allegedly being technically incorrect in the use of the terminology "create an imaging plane." Applicants are not sure of the source of the Examiner's confusion but suspect that one source of confusion is that the claims actually describe the imaging plane as created by the "micro lens array assembly", rather than a micro lens, as characterized by the Examiner.

The "imaging plane" is clearly shown in figure 1 (e.g., label 30) as resulting from the composite focus lengths of the entire plurality of micro lens in the array. Therefore, Applicants submit that one of ordinary skill in the art would readily understand the claim description that the micro lens array assembly does indeed create an imaging plane 30 and that this terminology is indeed technically correct to one of ordinary skill in the art.

Therefore, Applicants respectfully request that the Examiner reconsider and withdraw this objection.

## **III. THE REJECTION UNDER 35 U.S.C. §112, FIRST PARAGRAPH**

Claims 30-35 stand rejected as non-enabled by the specification. As best understood, the Examiner alleges that, because an imaging plane is not included in claim 30, the claim is not enabled by the disclosure.

In response, Applicants respectfully submit that the imaging plane 30,30a,30b,30c is clearly shown in Figures 1, 4-6, and 11. Applicants further submit that one of ordinary skill in the art would readily understand the description of independent claim 30 without providing details of the imaging plane, since, as even the Examiner concedes: "... an imaging plane is an essential feature for displaying a real image." Moreover, dependent claims 33 and 34 expressly describe the imaging plane.

Therefore, Applicants respectfully submit that there is no need to mention by name an element inherent in the description of independent claim 30 if one of ordinary skill in the art understands that the element is implied by the description, even if not expressly identified, as the Examiner has recognized. Applicants submit that the Examiner's role is that of rejecting the claim only if the metes and bounds would not be understood by one having ordinary skill in the art, not because the Examiner has preferred alternative claim language.

Accordingly, the Examiner is respectfully requested to reconsider and withdraw this rejection.

#### **IV. THE REJECTION UNDER 35 U.S.C. §112, SECOND PARAGRAPH**

Claims 18-23, 33, and 34 stand rejected as indefinite. Applicants believe that the above claim amendments appropriately address the Examiner's concerns for claims 33 and 34 and respectfully request that the Examiner reconsider and withdraw this rejection.

However, relative to the indefiniteness rejection based on claim 18, Applicants note that the rejection applies an improper legal standard in alleging that this claim is indefinite because "*There are numerous ways a display can be considered or interpreted as 'consistent with a three dimensional object'. The claimed limitation is unclear because the claimed language does not provide definite conditions or requirements of the components or the entire apparatus for what [is] meant to be 'consistent with a three-dimensional object.'*"

In response, Applicants respectfully direct the Examiner to MPEP §2173.04 that begins "*Breadth of a claim is not to be equated with indefiniteness.*" This section continues: "*If the claim is too broad because it does not set forth that which applicants regard as their invention as evidenced by statements outside of the application as filed, a rejection under 35 U.S.C. 112, second paragraph would be appropriate... If the claim is too broad because it reads on the prior art, a rejection under either 35 U.S.C. 102 or 103 would be appropriate.*"

In the instant evaluation, the Examiner's statement that "there are numerous ways ..."

clearly requires a prior art rejection, rather than a rejection for indefiniteness. Relative to the Examiner's statement that it is unclear what is meant by "consistent with a three-dimensional object", Applicants submit that this terminology has its own meaning, particularly when read in the context of the remaining surrounding words in the claim, as follows: "... said imaging plane provides an enhanced three-dimensional impression of said two-dimensional image by providing an illusion of depth in the displayed real image that is consistent with a three-dimensional object."

Applicants submit that the structure of the apparatus is clearly defined in independent claim 18 and that the Examiner's burden is actually that of finding a prior art reference that teaches a micro lens array that provides an erect real image at the same magnification in a manner that enhances the three-dimensional impression. Moreover, Applicants further submit that one of ordinary skill in the art would be puzzled by the Examiner's allegation that "*There are numerous ways a display can be considered or interpreted as 'consistent with a three dimensional object'*", since it would seem that there could actually be only the single way that the plain meaning of these words describe.

Finally, Applicants point out that dependent claim 20 identifies two specific mechanisms that have exemplarily been described in the disclosure for creating the enhanced three-dimensional impression, so that this dependent claim would clearly overcome any concern that a specific mechanism is not described in these claims 18-23.

Therefore, in view of the above discussion, the Examiner is respectfully requested to reconsider and withdraw this rejection of indefiniteness for claims 18-23, 33, and 34.

## **V. THE PRIOR ART REJECTIONS**

As best understood, the Examiner alleges that Clarke anticipates claims 25, 26, and 29, when modified by Shanks, renders obvious claims 18-24, when modified by Yoshikawa, renders obvious claim 27, and when modified by Shinoura, renders obvious claim 28.

Applicants respectfully disagree, since these prior art references clearly teach against the descriptions of the independent claims and are not properly combinable, because of the different teachings in each to achieve their express purpose.

### **The Anticipation Rejection**

First, relative to the anticipation rejection based on Clarke, contrary to the Examiner's characterization, this reference clearly teaches having the display 10 parallel to the micro lens

array 30. For this reason alone, the present invention defined by independent claim 25 is clearly patentable over Clarke. The advantage of this characterization of one embodiment of the present invention is that tilting the display relative to the micro lens array permits one way to achieve the three-dimensional effect without having to either distort the original image or vary the lens structure of the array.

Relative to the Examiner's characterization that the diamond-shape rays in Figure 2 is somehow evidence that there is a same magnification for the micro lenses in the array 30, Applicants direct the Examiner's attention to lines 32-36 of column 5, wherein Clarke describes that the power of the microlenses can vary over the area of the array, but in the preceding lines 31-32 describes that the microlenses could be substantially identical.

Applicants submit that this difference is explainable in view of the description at lines 11-32 of column 2, and particularly lines 21-25, wherein it is described that the purpose of Clarke is to "... re-image the display produced by the panel onto the curved viewing screen ... to conform with the curvature of the viewing screen." As explained at lines 28-31 of column 1, the problem being addressed in Clarke is that "... it would be beneficial if the display viewing surface were curved so as to conform with the dashboard or head rest contours and present a continuous curved surface flush with the surrounding structure."

With this clarification, Applicants submit that whether same magnification is used in Clarke depends, therefore, upon whether the display is curved to correspond with the curvature of the viewing screen, as explained in lines 13-16 of column 2.

In summary, Applicants again submit that the reason that Clarke does not tilt the display relative to the screen while maintaining same magnification of the micro lenses is that Clarke does not intend to enhance the three-dimensional aspect of an image. Its express purpose is that of re-imaging the display onto a curved viewing surface that is flush with its surrounding structure. Moreover, because of this express purpose that differs from that of the present invention, Clarke can only be characterized as teaching against the invention defined in independent claim 25.

Hence, turning to the clear language of the claims, in Clarke there is no teaching or suggestion of: "...a micro lens array spaced apart from the display for creating an imaging plane in a space opposite the display, the micro lens array being an upright image optical system having a same magnification, the micro lens array being not parallel to the display", as required by independent claim 25.

As Applicants have already explained, claim 25 recites that the micro lens array

creates an erecting image at the same magnification, meaning substantially 100% magnification. As mention previously, one advantage of such micro lens array is that the created image has always the same size regardless of the distance between the display and the micro lens array.

In other words, the image shown in the display is simply projected in the space without any modification. If the micro lens array does not create an erecting image at 100% magnification, and the claimed invention were to be used in the same manner as shown in Clarke, then the projected image has some distortions at the edge, because the magnification of the projected image changes with the distance between the display and the micro lens array. The same can be said concerning Shanks. In fact, Shanks even takes advantage of such different magnifications, as shown in Figure 9.

Recently-added claim 26 sets forth that all the convex lenses in the micro lens array have the same shape. This aspect makes the manufacturing of the micro lens array easy. Another advantage of having the same lenses is that tolerance is given to placement of the lens array. If the lenses have different radius of curvature, very precise placing of the lens array is required.

Specifically, if the distance between the display and the micro lens array is not exactly the intended distance, then the intended magnification is not achieved in the projected image and, therefore, the projected image will distort.

Clarke, at lines 32-36 of column 5 explicitly mentions that the micro lenses in the array 22 have different radius of curvature. In contrast, the same shape of the lens, as defined in claim 26, inherently provides the present invention with a margin, since some misplacement of the micro lens array does not affect the magnification of the projected image because the micro lens array creates an erecting image at the same magnification as the original magnification (e.g., 100% magnification). In the present invention, the lenses in the lens array do not have to be changed to those having different sizes, even if the distance between the lens array and the display changes.

#### **The Obviousness Rejection Based on Shanks**

The Examiner alleges that one having ordinary skill in the art would have been motivated to modify Clarke in accordance with Shanks and that such modification renders obvious claims 18-24.

Applicants respectfully disagree and submit that the description in Shanks itself

clearly demonstrates that, even if modified, the plain meaning of independent claim 18 would not be satisfied.

More specifically, the Examiner considers that Clarke teaches all limitations of claim 18 except that the image is displayed at the same magnification. To overcome this deficiency, the Examiner invokes Shanks. However, Applicants submit that Figure 9 of Shanks clearly shows that this secondary reference relies upon variations of magnification, so that, even if Clarke were modified in accordance with Shanks, the plain meaning of the claim language is clearly not satisfied and, indeed, Shanks actually teaches against the very feature upon which the Examiner relies.

Hence, turning to the clear language of the claims, in Clarke, even as modified by Shanks, there is no teaching or suggestion of: "... each said at least one micro lens array assembly configured to create an imaging plane displaying an erect real image of the two-dimensional image at a same magnification", as required by independent claim 18.

Furthermore, Applicants submit that Clarke and Shanks are addressing different problems and, therefore, non-analogous art. As explained above, Clarke addresses the problem of re-imagining the image to focus onto a surface shaped to be flush with its surrounding structure, whereas Shanks more reasonably addresses the problem of the present invention, that of attempting to enhance the three-dimensional quality of the image.

Because the curvature of the viewing surface of Clarke is nowhere described therein as attempting to enhance the three-dimensional quality of the image, the Examiner cannot simply ignore the purpose and engineering reality of this primary reference. The principle of operation (e.g., the design of the re-imaging) of the primary reference Clarke would inherently have to be changed in order to convert its purpose of accommodating an image to the curved surface flush with its surrounding structure into that of Shanks, which is to enhance the three-dimensional quality of an image.

As the Court held in *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA, 1959), as described in MPEP §2143.01: "*If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious.*"

Therefore, the Examiner is respectfully requested to reconsider and withdraw this rejection.

**The Obviousness Rejection Based on Shinoura**

Concerning recently-added claim 28, this claim reflects the embodiment shown in Figure 11. The micro lens array is flat (or does not bend). The micro lens array 22 of Clarke bends. The flat micro lens array has a larger angle of view than the bending micro lens array. If the micro lens array bends, the light passing through the micro lens array refracts in different directions so that some light does not proceed towards a viewer.

As Applicants explained in their previous response, this effect makes the periphery of the projected image non-visible in Clarke. In other words, the angle of view is made smaller.

In contrast, in this embodiment of the present invention of Figure 11, the micro lens array is flat, so that the light passing through the micro lens array proceeds straight. Therefore, as shown in the attachment of the previous Amendment, the angle of view is not affected in the present invention.

Applicants submit that the Examiner simply attempts to change the principle of operation of the primary reference Clarke in order to satisfy the claim language. Such change in principle of operation is not allowed, as explained above relative to *In re Ratti*.

Finally, Applicants again point out that Shanks uses the curved saddle-shaped surface 3 of glass in order to display an image. This surface 3 is not needed in the present invention, since it displays the image in space. Clark also requires a screen to display an image, in contrast to the present invention.

Thus, the present invention creates a three-dimensional-like image in space. Shanks and Clarke both create their three-dimensional-like image on a physically existing surface (e.g., a bent glass or screen). Applicants submit that the viewer has a more enhanced three-dimensional impression in the present invention than in either Shanks or Clark.

Therefore, Applicants submit that, since there are elements of the claimed invention that are not taught or suggest by Clarke and this reference cannot be modified without violating the objective analysis guidelines of MPEP §2143.01, the present invention is clearly patentable over Clarke. Applicants, therefore, respectfully request that the Examiner reconsider and withdraw these rejections based on Clarke.



## VI. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 18-35, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: 2/10/06



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